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Worldwide Report

NUCLEAR DEVELOPMENT AND PROLIFERATION

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GOVERNMENT SEEKS TO REFORM URANIUM POLICY

Roxby Downs Exports Okayed

Perth THE WEST AUSTRALIAN in English 6 Apr 84 p 12

[Text] ADELAIDE: Overseas sales of Roxby Downs uranium now seem certain after yesterday's announcement of Federal Government export approval for the project.

The Federal Government blessing on exports from the project was read to the South Australian Parliament yesterday by the Minister of Mines and Energy, Mr Payne.

The Federal Government has given the mine full environmental clearance.

The go-ahead for Roxby exports is another step in the Hawke governments' pro-uranium push, leading up to the July national ALP conference.

Earlier this week the Prime Minister, Mr Hawke, hinted at moves to bind his 27-member Ministry to a pro-uranium vote at the conference.

If the conference, as expected, leaves Roxby intact, the key to the mine's future will then rest with the joint venturers, Western Mining Corporation and BP Australia.

Study

The outcome of their $140 million mine feasibility study is not expected till the end of the year.

The federal ALP caucus voted 55-46 in November last year to endorse the Cabinet's recommendation to allow Roxby Downs to proceed.

The WMC chairman, Mr Hugh Morgan, said he had been told of the decision in a letter from the Minister for Resources and Energy, Senator Walsh.

He said that the letter was part of the executive process for entering the market place, but it did not change anything the company was doing in an "administrative sense."

The Leader of the South Australian Opposition, Mr Olsen, said that the approval should represent the removal of all political impediments to the project's future.

AGE Editorial: Sensible Policy

Melbourne THE AGE in English 4 Apr 84 p 13

[Editorial: "Common Sense on Uranium"]

[Text] IF the Prime Minister, Mr Hawke, has his way, as he is apt to have in a Government heavily dependent on his high electoral popularity, the Labor Party will adopt--with one exception--a more relaxed attitude towards the mining and export of Australian uranium. The exception is a tougher stance towards uranium exports to France so long as the French continue their nuclear testing in the Pacific. But even this concession to the anti-uranium movement will not avert a vehement struggle by the Socialist Left and its allies at Labor's national conference in July to resist the shift in policy.

A resurgence of the divisive uranium controversy has been triggered by the publication of a new policy draft prepared by the Resources Minister, Senator Walsh. Intended to replace the ambiguous policy cobbled together as a compromise in 1982, the Walsh proposals would allow the export of uranium, from new as well as existing mines, under the most stringent nuclear non-proliferation conditions, to those countries which the Government is satisfied maintain strict safeguards and security controls over their nuclear power industries. That is very different from the present policy commitment--even though it is not tied to a timetable--to phase out the uranium industry.

The Walsh draft may be modified by the Government's industry development platform committee before it goes to the conference, but the pro-mining pragmatists appear to be in the ascendancy in the parliamentary party. The new Centre Left faction has expressed support for the revised policy favored by Mr Hawke, and a senior Minister, Mr Dawkins, has boldly declared that the issue is no longer about uranium mining or now mining but about "how best you might arrange for the inevitable". On the other side, the Victorian party conference has stiffened its anti-uranium stances which, however, seem unlikely to attract sufficient support at the national level.

The proposed ban on uranium exports to France, although sure to be welcomed by the anti-uranium forces, could have serious repercussions on Australian trade. The Prime Minister's announcement last year that uranium shipments to France would be suspended had little practical effect because the next shipment was not due until October this year. The problem is that if the Government abrogates the present contract with Queensland Mines to supply 2600 short tons to France between 1982 and 1988, the French could ask the European Economic Community to retaliate. The use of a trade ban on a particular product to a particular country as an instrument of foreign policy is seldom sensible and often counterproductive.

However, the question of uranium exports to France is separate from the broader issue of Australia's participation in the uranium industry. Here the main concerns are the dangers of nuclear proliferation and the problems of nuclear waste disposal. Safeguards against the possible misuse of nuclear material are difficult to enforce, but Australia's conditions of sale are already among the world's most stringent. The minimal risks have to be weighed against the undoubted benefits of uranium sales to Australia and of nuclear energy to those countries dependent on it for power generation. The problem of waste disposal is still a worry but with new technology it is no longer insuperable. Emotions aside, there is no conclusive evidence that leaving Australian uranium in the ground would make the world significantly safer. It would certainly leave it poorer.

CSO: 5100/4366

EDITORIAL VIEWS RESULTS OF PRC-U.S. NUCLEAR PACT

HK280740 Hong Kong WEN WEI PO in Chinese 28 Apr 84 p 2

[Editorial: "China and the United States Reach an Agreement on Nuclear Energy Cooperation"]

[Text] China and the United States have reached an agreement on the peaceful use of nuclear energy, and on 30 April the two countries will initial an agreement on cooperation in the peaceful use of nuclear energy. This is a major development in Sino-U.S cooperation in the peaceful use of nuclear energy. Motivated by a desire to cooperate, both sides finally reached a settlement which violates neither China's sovereignty nor U.S. law. This agreement will open up broad prospects for Sino-U.S. cooperation in the peaceful use of nuclear energy.

Since 1981, China and the United States have been negotiating on how to conclude an agreement on nuclear energy cooperation. According to the agreement, U.S. nuclear energy corporations will provide China with 12 nuclear reactors worth between $20 and $25 billion.

This agreement has been under negotiation since 1981. The problem which caused differences was that the United States wanted to carry out on-site inspection. It maintained that this was required by U.S. law, which stipulates that countries which buy U.S. nuclear reactors can only process the nuclear fuels in the reactors with the approval of the United States, so as to guarantee that the processed nuclear fuels will not be used in the military field, that is, will not be used for manufacturing nuclear bombs and atom bombs. The Chinese side maintained that this was a matter involving state sovereignty, so it refused this demand.

In the course of the negotiations, China joined an international atomic energy organization. This is good for China in carrying out nuclear technological exchanges in the international field. China must abide by the stipulations of the "International Atomic Energy Committee" in exporting nuclear power. During his visit to the United States in January this year, Premier Zhao Ziyang said: "We will not carry out nuclear proliferation, nor will we help other countries manufacture nuclear weapons." This clearly shows that China will not carry out nuclear proliferation. The U.S. authorities maintained that "this is a step which merits appreciation" and that the obstacle to Sino-American nuclear cooperation had been removed, as China had provided a guarantee.

With regard to the on-site inspection, the stands of both sides were given consideration. The agreement stipulates that "it is necessary for both sides to carry out discussions and exchange data and to inspect fuels, facilities, and components so as to guarantee that the agreement will be implemented on a limited basis."

Richard Kennedy, a responsible person for U.S. nuclear affairs, visited Beijing last week and discussed with the Chinese side the problem of nuclear cooperation between the two countries. An understanding was reached and essential progress was made in the 3-year-long negotiations on concluding an agreement on nuclear cooperation.

This agreement will provide a legal basis for the United States in selling nuclear reactors, components, nuclear fuels, and nuclear technology to China. The agreement stipulates that the two countries can exchange data and technology, but it also stipulates that the United States is responsible for transferring sensitive nuclear technology and facilities, such as factories for reprocessing and enriching uranium.

It was disclosed that the agreement embraces the restrictions by U.S. law on nuclear fuels and facilities, but that Chinese sovereignty will not be infringed upon. Thus, through negotiations, differences were resolved.

It is predictable that this agreement will provide large business transactions for the U.S. nuclear industry. This is beneficial to the United States. On the part of China, nuclear power stations are beginning to take shape, and a group of nuclear stations will be put into operation by the end of this century. The nuclear reactors provided by the United States will be of great help to the construction of China's nuclear power stations. Sino-U.S. nuclear cooperation will have an important bearing on the realization of China's strategic aim.

CSO: 5100/4123

BRIEFS

NUCLEAR EQUIPMENT PLANTS FROM SWEDEN--The Esab firm [of Sweden] has received an order from the Chinese nuclear power program. This order covers three welding plants with a total value of 11 million kronor. This means that in a period of a little more than six months Esab has taken home orders from China worth a total of 40 million kronor. [Excerpt] [Stockholm DAGENS NYHETER in Swedish 19 Apr 84 p 8]

CSO: 5100/2557

FUTURE OF NUCLEAR STEEL MILLS DISCUSSED

Prague KVETY in Czech No 6, 1984 pp 31-35

[Article by Eng Jan Tuma: "Toward a Nuclear Metallurgical Plant--Can Ironworks Do Without Blast Furnaces?--Successful Czechoslavak OXYVIT--Betrothal of Converter and Coal--Return to Sponge Iron--'Dry-process' Steel Without Melting?--First Nuclear Metallurgical Plants After the Year 2000"]

[Text] Priority of Iron and Steel

A report stating that worldwide production of plastics just exceeded in its volume the production of iron and steel does not mean that metal--"from which our civilization is forged"--is on its way out. World steel production reached three-quarters of a billion tons per year, despite the fact that ore prices keep increasing as do those of energy--which metallurgical combines literally gulp down in great quantities--and that a considerable shortage of coke is setting in. Every fifth ton of steel was produced in the USSR and almost every fiftieth ton in the CSSR. Through our annual production of approximately 15 million tons of steel and 10 million tons of iron we rank among the recognized metallurgical superpowers.

Implacable Pressure of Automation

The danger of coming into contact with red-hot metal and exhausting labor have been calling for mechanization and automation for a long time. When it was to be implemented in the postwar period it turned out that the obsolescent discontinuous and two-stage process of iron and steel production did not lend itself to complete automation. A harmonic balance between the intermittent cycle of a blast furnace with a tremendous capacity, between smaller steel-making furnaces and, ultimately, the casting field and the rolling mill cannot be struck even with the best of computers. Thus, metallurgists had to reach deep down into the principles of technologies and come up with continuous production processes.

This tremendous breakthrough is in its initial stages. Dozens of plants producing sponge iron without the traditional blast furnaces are already in operation. Almost 50 percent of all steel is already cast by fully automated continuous casting processes. Oxygen converters are rapidly displacing open-hearth furnaces. Industrially advanced countries are overhauling at an

accelerated rate operational layouts of metallurgical combines to produce on the same area more high-quality metal through modern technology with lower consumption of raw materials and energy. These countries are not interested in exporting metal and seek to turn it into products. On the other hand, developing countries that are rich in ores and fuels are building small supermodern metallurgical plants with which to prop up their own industry. The greatest interest is shown in miniature metallurgical plants with an annual capacity of approximately half a million tons of steel. New and rebuilt combines significantly reduce the emission of pollutants that used to poison the environment.

Improved Blast Furnaces

The principle did not change even after half a millenium. On the other hand, the dimensions and intensity of the process are heading for a new high. Computers "scientifically " control the preparation of the charge. The charged ore is processed, enriched and takes the form of pellets (spherical granules). Reduction still makes use of coke, the consumption of which per ton of iron decreased all the way down to 350 kg. That is a great achievement, because a quarter century ago 900 kg was considered a good value.

The combine in Krivoy Rog boasts one of the largest blast furnaces in the world. The capacity of the furnace, which has the height of a 15-story building, is 5,000 cubic meters. Up to 10,000 tons of pig iron flow out through its four tap holes with brief intermissions every day. The air forced into the furnace is heated up to 1,400°C and is enriched by a one-third share of oxygen. Pressures, temperatures, flow-through and gas-composition analyses are controlled by 200 sensors; the optimum progress of melting is controlled through signals by a computer. There occurred great reductions in the consumption of coke, and the number of metallurgical personnel required to produce a ton of metal dropped to one-third.

Some countries, such as Japan, are forced to replace coke which is in short supply by coal dust, heating oil or natural gas, or are preparing for the transition to producing sponge iron without a blast furnace.

Rennaissance of Converters

The history of modern steelmaking was launched 125 years ago by Henry Bessemer, who started forcing air through a liquid bath in a pear-shaped container. There is no need to provide heat for the inside of the converter (he so named his device because it could be collapsed, i.e., converted): combustion of unwanted elements in the liquid pig iron is provided by atmospheric oxygen so intensively that the bath is tempestuously boiling. When another English metallurgist, G. Thomas, provided converters with a lining and admixtures enabling them to handle even the most commonly used hypophosphitic ore, converters were fully on their way. However, a concern over what to do with the old iron started to arise. The latter could not be used in the original converters for processing into new steel. Thus there came about the development of open-hearth furnaces heated by flames. The melting process took up to 15 times as long as in a converter; however, it became possible to add scrap

metal and there was enough time to adapt the bath by admixtures. As late as 1955 some 77 percent of the world's steel was produced in open-hearth furnaces--with 14 percent accruing to converters and 9 percent to electric furnaces.

The rennaissance of the converter that occurred 20 years ago goes to the credit of the well-known Austrian metallurgical plant in Linz and Donawitz, where they invented an oxygen converter designated as L-D. Forcing oxygen through a specially cooled jet to the level of the liquid charge cut down the melting time to approximately 20 minutes. The largest converters produce in one day as much as 700 tons of steel, the quality of which exceeds in many properties that of open-hearth steel. That is why all our steel mills are currently being redesigned. The first steel mill in the East Slovak Ironworks of Kosice was equipped with Austrian oxygen converters, the second mill had our 150-ton converters from the Vitkovice Ironworks of Klement Gottwald. The overhaul of the steel mill in Trinec--which will use large Soviet oxygen converters--is nearing completion. Of course, progress did not stand still. In the United States they started to force oxygen into converters, designated as Q-BOP, from below through special jets together with lime and slag-forming admixtures. The system is lower and up to one-third of scrap metal can be added into the converter.

Success of OXYVIT

Researchers from Vitkovice also oriented themselves toward forcing oxygen into converters from below. They started out in 1974 with a small converter and gradually expanded their method by dozens of inventions. Among the most valuable is an improvement of the open system for cooling the jets that are in contact with metal of a temperature of 2,500 to 3,000°C. From the designation for oxygen (oxy) and the place where the idea was conceived (Vitkovice) the new system was named OXYVIT. It is a documented fact that the annual production of a million tons of steel by OXYVIT converters saved our metallurgy industry 130,000 tons of standard fuel, 9,000 tons of liquid fuels, 50,000 tons of heat-resistant materials, 27,000 tons of admixtures and manpower savings on the order of 700 workers. In addition, 2,500 tons less of sulfur dioxide and dust pollutants escaped into the atmosphere.

New Mission for Converters?

The fact that the last word has not been said on the development of converters is borne out by the news of new revolutionary changes. Soviet metallurgists in Tula launched into operation a converter with bottom oxygen blasting in which, thanks to additional lateral jets, for the first time in the history of metallurgy it is possible to use a charge of scrap metal alone. Of course, due to the requisite melting the fining cycle is prolonged to 1 hour. On the other hand, the Japanese changed the converter into a gas generator. From the top they blow coal dust onto the surface of the boiling metal bath. The coal reacts with oxygen at a temperature of 1,600°C while generating heating gas. The bath must be cooled by water steam and the addition of scrap metal. The forming slag is continuously drained. The fact that carbon is converted into a gaseous state with 98 percent efficiency is of importance. The generated

reduction gas could be used in a reduction or blast furnace; the metal charge--as shown by experiments--makes it possible to prepare in this converter also stainless steels.

Will Sponge Iron Displace Blast Furnaces?

Sponge iron was turned out by metallurgists in antiquity and the middle ages, because they were unable to generate in their primitive furnaces temperatures sufficient to melt iron. Today, technology is making a comeback in the extraction of oxygen from ore at lower temperatures and without melting--but on a modern industrial basis. This was started 30 years ago by the Swedes, and 12 years ago plants for the production of sponge iron launched operations in Mexico and Venezuela.

The processes patented up to the present involve some 50 methods that differ according to whether the sponge is produced in a retort, a shaft furnace, a rotary furnace (as in cement factories) or in a turbulent layer. The initial material is formed by high-quality ore or pellets, for reduction (extraction of oxygen from ore) use is made of the reduction gas obtained from crude oil, natural gas and, exceptionally, from lignite. The sponge and scrap metal is remelted in electric furnaces and its composition is adjusted by admixtures.

The Italians bet their money on the LURGI rotary furnaces based on the principle of the Krupp-Renn revolving furnaces that failed to find wide application in our country many years ago. However, instead of low-grade ores, enriched pellets are fed against the flames from burners. The Americans are looking into the FIOR process in which finely ground ore is carried in the vortex of reduction gases. What comes out of the reactor resembles iron dust. To prevent it from oxidizing it is pressed into iron briquettes welded into foil. The MIDREX process proved to be most suitable for European conditions. Oxidized pellets in a shaft furnace are exposed to reformed natural gas and scrubbed charge gases are ingeniously used for preheating the charge. The first metallurgical plant for the production of sponge iron launched its operations in Oberhausen (FRG) in early 1970. Currently, 50 plants worldwide turn out 50 million tons of sponge iron annually.

The Electrometallurgical Combine of Oskolsk

It is being completed with participation by companies from abroad in the Kursk region, where there the world's greatest deposits of iron ores are located. The combine will become the world's largest metallurgical plant without blast furnaces. The dressed ore powdered in water is repumped by pipelines (orelines) to the Lebedinsk enriching plant, where it is pelletized with the use of bentonite. Some 2.5 million tons of oxidized pellets annually pass through four MIDREX shaft furnaces, and in the adjacent electric steel mill are turned into 2 million tons of high-quality electric steel. The pellets are exposed to the effects of hot gas at 760°C in 60-m high blast furnaces for 6 hours. We do not contemplate the use of this method in our country, because we have an excellent coke base; the crude oil and natural gas required for the generation of reduction gases would have to be imported.

Emergence of Plasma in Metallurgy

The highest quality steels are produced in electric arc furnaces. However, the maintenance of an arc affecting the bath by a temperature of 3,600°C causes no small amount of trouble for metallurgists. During its "stretching" early in the melt and after turning off the network becomes subject to undesirable shocks. The power input is high and the furnace "roars" almost as loudly as an aircraft engine. In attempts to "reinforce" the flashing-over arc by a water funnel it turned out that arc temperature increased up to 20,000°C, with the gases undergoing transition into the fourth state of matter--plasma.

The most suitable source of plasma are plasmatrons resembling jets with a red-hot ionized gas flashing out of them. Metallurgists of the Freiwald metallurgical plant in the GDR combined their efforts with those of the metallurgists of the Chelyabinsk combine toward the development of large plasma furnaces. They modified the design of plasmatrons, tried out the most varied linings capable of withstanding a tremendous amount of heat. They started out with small furnaces and by now the already famous 30-ton plasma furnace in Freital has 6 years of operation behind it. In Chelyabinsk they even started-up a 50-ton furnace. The melting time was cut down to one-third and energy savings per ton are 60 kilowatt-hours. Licenses for operating the world's "hottest" metallurgical furnaces have already been applied for by 12 of the most renowned Western companies.

Plasma burners will affect metallurgy even more conspicuously by the end of the current century, specifically in the continuous (i.e., uninterrupted) production of steel from powdered ores or sponge iron. The raw material together with the admixtures during passage through the trough will be exposed to flames generated, e.g., by a rotating plasma arc.

Pyrometallurgy?

There are so many unconventional methods of steel production that it is impossible just to mention them all. A promising field appears to be that of so-called pyrometallurgy, which intends to produce steel without melting the metal, in other words, during a "dry process" finely ground ore is magnetically sorted by supraconductive magnets, other undesirable inclusions are separated chemically and the semifinished product is reduced to pure iron in the form of powder. The latter is then used for pressing and sintering final products of extraordinary quality. A completely new development are the so-called metal glasses made by superfast cooling of metal melts. For the time being they are produced only in the form of thin strips, but their properties are outstanding because of their bilateral structure. They are harder and more resistant than alloyed steels, their magnetic losses are minimal, almost impervious to wear.... Each such advance in production of metals finds an immediate response in new methods of processing and in products with innovated properties.

Steel Hardens in 4,000 Streams

The converter's inventor, H. Bessemer, was already trying to find a way of getting around the casting of steel into molds (forms), an extraordinarily laborious operation connected with considerable (up to one-third) loss of metal. However, at the level of technology then existing his experiments--casting liquid steel between cylinders intensively cooled by water between which it would harden and assume the configuration of the formed gap--were a lamentable disappointment.

It was only 20 years ago that steel and nonferrous metals started to be cast into strongly cooled, lubricated and vibrating molds without a bottom--into crystallizers. At the onset of casting the bottom must be closed by means of the so-called enticer. As soon as the surface of the metal hardens, the enticer starts to recede and through the bottom of the crystallizer there emerges a practically endless cast accretion. It is wetted by water showers and roller conveyers pull it away and bend it onto a horizontal conveyer where shears cut it into semifinished products as predetermined. The steel emerges at a velocity of up to 2.5 m per minute and even higher-quality steels can be cast. Modern continuous casting of wide slabs (plates up to 2.6 m wide) is installed in the East Slovak Ironworks. Its twin line has an annual capacity of 1.2 million tons; a smaller line is used in the Sverma Ironworks in Podbrezova. However, these constitute only 3 of the 4,000 lines at which 200 million tons of steel are cast annually worldwide.

Betrothal of Metallurgy and Nuclear Energy

The world uses 11 percent of the energy under its stewardship for the production of steel. As soon as fast nuclear reactors with high-temperature operation find application by the end of the next decade, the gates will be open to the utilization of nuclear energy in metallurgy. Several varying and almost utopian concepts of nuclear metallurgical plants have been published so far. The combination proposed most often is a system for the production of sponge iron fed with reduction gas obtained through the decomposition of natural gas by nuclear heat. The sponge iron is to be melted and refined in electric furnaces fed by current from an adjacent nuclear power plant with a helium circuit and gas turbines. These would make up a metallurgical combine which could supply excess energy to its environs.

Academician N. Rybalkin points out problems that stand in the way of such projects: in view of the high power outputs of reactors of the second generation, up to 20 furnaces for the production of sponge iron would have to be connected to a single reactor. That would call for a considerable expansion of today's capacity of metallurgical plants. Moreover, there will be a need for overcoming the essential disharmony between the two partners. Reactor start-up from cold state takes only several hours, while the blowing-in of a reduction furnace cannot be accelerated to last less than 3 days.

According to Rybalkin, however, such nuclear metallurgical plants will have nothing in common with today's smoke-filled combines. They will be characterized by a glass-enclosed shop and installation structure. Ore will be fed by pipelines from processing plants, metal will be transported in

electromagnetic troughs which will act as pumps. Continuous casting will be tied in with rolling mill trains which will have to accelerate their present rate of operation. And the world will receive cheaper and higher-quality steel products.

8204
CSO: 5100/3013

NUCLEAR POWER SYSTEMS DESIGN, PRODUCTION DESCRIBED

Warsaw TRYBUNA LUDU in Polish 6 Apr 84 p 4

[Article by Zbigniew Wrobel: "Zamech's New Specialty--A Nuclear Turbine for Zarnowiec Electric Power Plant"]

[Text] Poland's first nuclear power plant at Zarnowiec Lake in the northern part of Gdansk Province has been under construction for 2 years. According to a completion schedule for this investment project, electric current will first be supplied from here to the domestic power system some time in 1990 when the first power unit based on the WWER-440 pressurized water reactor will be activated.

The Polish nuclear power plant is being built according to Soviet technological design, proven safe and economical over many years of operation in other countries. The Zarnowiec power-generating section will slightly differ from similar plants now in use in the Soviet Union Czechoslovakia and Finland. Many pieces of equipment in this section will be of Polish design and make

The Zamech enterprise from Elblag is one among the domestic suppliers of equipment for the Zarnowiec plant. Dozens of drafts of machinery for nuclear power generation, engine room equipment, a huge 600-ton condenser, two- and four-stage heaters, various control devices and pumps, and, most importantly, the turbine--all unprecedented production ventures for Polish industry--are being developed in Zamech design studios.

Strict Requirements

"We are currently midway into our power-generator design cycle for the Zarnowiec power plant," says Engineer Czeslaw Gren, Zamech's top designer. "We do not have to rush because we are required by the contract to deliver the first generator in 1989.

"In effect, there is enough time for precise, solid work on the turbine, which is, after all, required by the extraordinarily strict reliability and safety requirements for the operation of such machines. While designing it, we rely mainly on our own extensive experience in the design and manufacture of turbines and on opportunities to access state-of-the-art knowledge in this area, provided by our cooperation with the Swiss BBC company and with Soviet power specialists.

"Under the system applied in nuclear power plants built to date on the basis of WEER-440 reactors, s single reactor is coupled with two turbine sets of approximately 230 megawatts each. We proposed a different combination, replacing two turbines with a single 465-megawatt one. Though creating greater technological problems, this assures a saving of nearly 60 percent of expensive, quality material, along with an increase of approximately 25 megawatts per turbine equivalent to 100,000 tons of coal a year."

According to Engineer Jerzy Kurk, chief specialist on atomic power turbines, the four power generators to be installed in Zarnowiec make the sum total of such economies very attractive.

The Soviet specialists who developed the technological plan for the Zarnowiec plant have approved the Zamech design decision. Overall, the generator will be a machine of a different generation than those manufactured by Zamech up to now.

Technological Problems

The problems to overcome are more difficult than those encountered in regular turbines: for example, steam in a conventional turbine has pressure of 180 atmospneres and temperature of 535 degrees centigrade. In an atomic turbine, steam is pressurized to only 47 atmospheres and has a temperature of 254-255 degrees centigrade; moreover, it has a high moisture content, so that a large amount of it condenses when transmitting energy on rotor blades, thus corroding the metal.

Accordingly, subassemblies for the Zarnowiec turbine sets will be larger than those for conventional turbines, to accommodate the low temperature steam parameters. They will be cast in new types of metal, resistant to corrosion and meeting very high standards of safety. Sample castings of new varieties of steel, including one with a high chromium content, have already been made at Zamech.

Tests will be run shortly on a new processing technology for materials used in atomic turbines. Some of them require the use of vacuum technology. To master all problems in design and technology affecting the manufacture of nuclear energy generating equipment, Zamech should have 2.5 billion zlotys at its disposal. A larger portion of this total should be used for the purchase of equipment: precision machine tools and vacuum treatment appliances for the turbine castings hardening department.

Unfortunately, to date the Elblag plant has found it difficult to obtain credit adequate to its needs. Hence, though more than half of the documentation on turbine sets has been completed, barely 2 percent of production preparations has been completed. This delay may adversely affect the pace of construction of the first generator.

8795
CSO: 5100/3014

YRIART REVIEWS BUDGET CUTS EFFECTS ON MAJOR NUCLEAR PROJECTS

Buenos Aires ENERGEIA in Spanish No 43, Jan 84 pp 1203-1204

[Article by Martin F. Yriart]

[Text] A drastic reduction in the CNEA's [National Atomic Energy Commission] budget, and the consequent delays in a number of major research and development projects were reflected in the 7 December 1983 report on the CNEA's activities in 1983. This report was presented to the media, as similar reports have been presented at the same time in past years, by the outgoing head of the organization, Vice Admiral (Ret) Dr Carlos Castro Madero.

This report is of special significance, since it is the final report of the organization under its outgoing director. For this reason it can also be viewed as a basic inventory of the heritage being turned over to new leadership. And during the next 12-month period, it will serve as a point of comparison in order to determine the progress of the Argentine nuclear sector.

The length of the report--33 typed pages, followed by two financial charts--and its almost telegraphic style make it impossible to describe all its points. Here we will discuss those points which are of most significance for the energy sector.

Atucha I repeated its normal high level of performance. As of 4 December 1983, it had generated 2,211,296 megawatt-hours, which, combined with another 347,970 mwh available but not required by the Unified Load Office, come to a total of 2,599,266 mwh; that is 15.7 percent more than the commitment that was made to the department of energy. It represents a load factor of 81.4 percent and an availability level of 94.2 percent. Once again Atucha I was the power plant with the lowest cost in the public system, with an average cost for the year of 22.4 thousandths of a dollar per kilowatt-hour generated.

Embalse reached a 100 percent power level. The Embalse Nuclear Power Plant, which went critical on 13 March and was connected with the national power network on 25 April, was officially inaugurated on 3 May 1983, and on 15 September reached 100 percent of its power rating. Last year it generated 698,675 net megawatt-hours for the electricity network. To summarize the final construction data, for the construction of this plant Argentina provided 35 percent of the engineering, 95 percent of the civil engineering and construction, 33 percent of the electromechanical supplies, and 90 percent of the assembly and installation work. This provided a high level of on-the-job training and experience for Argentina's nuclear engineering and industrial sector.

Atucha II is already 2 years behind schedule. Due to budget restrictions, this project is only 32 percent complete, and is not expected to begin operation until June 1989. On 25 November 1983 the "floatation operation" for the reactor building's containment sphere was conducted.

The fourth nuclear power plant could be of Argentine design. A status report on the feasibility study for the fourth nuclear power plant reached a preliminary conclusion that it would be possible to design and build in Argentina a nuclear power plant with a CANDU 600-MW reactor, similar to the Embalse Nuclear Power Plant, using Argentine engineering, manufacturing, and construction skills. The final study should be completed by March 1984.

Uranium resources have increased by 1,100 tons. Projected as of 31 December, these reserves amount to 31,463 tons of concentrate, including reasonably certain reserves and additional probable reserves, at costs of up to $30 per pound of concentrate, based on the new reserve classification system proposed by the IAEA [International Atomic Energy Agency]. This means that despite the consumption of reserves required for making fuel, the balance is continuing to grow at a rate of approximately 1,000 tons a year.

Production of concentrate came to a total of 203 tons. This figure was lower than the 226 tons originally scheduled. The CNEA plants in Malargue and San Rafael had a total production of 155 tons, 3.3 percent more than planned, and Malargue in 1983 repeated its annual production record set in 1982 with 95 tons. At the private Los Gigantes plant, though, real production was 48 tons, which is only 63 percent of the planned level of 76 tons. To the production of this period should also be added the return of 80.3 tons which had been lent to Brazil in 1982.

The start of operation of the dioxide plant has been completed. This plant, which opened in December 1982, had run into operational problems while starting to function, until it reached the scheduled monthly production level of 13 tons of dioxide on 21 September 1983. The cumulative production for 1983 was 55 tons.

Independently of this operation, the national dioxide production line has been completed. Its specifications are suitable for producing the type of fuel used in Atucha and Embalse.

Conuar produced 290 fuel elements of the Atucha I type. This production enabled the plant to satisfy its fuel requirements with an Argentine source of uranium supplies.

The installation of the Embalse fuel plant has been completed. Manufacture of a series of 1,200 fuel elements of the Embalse type has begun. These elements will begin to be placed in the plant's reactor starting in February 1984. In the meantime, some minor modifications in the equipment will be made.

The zircaloy tube plant is now in production. While the facilities are being completed and new phases in the zircaloy cycle are being planned, the plant has completed the manufacture of the first of four batches of 1,000 tubes, which will be used for qualification tests for tubes to be sent to Brazil. When this phase has been completed, there will be a production run of an additional 160,000 meters, as specified in the current contract.

In addition, after the manufacture and checkout of an experimental batch of 800 meters, the first phases of the manufacture of tubes for Embalse-type fuel elements will begin.

On the subject of the equipment and completion of the plant, grinding, trimming, and cutting equipment for the "trex" tube phase has been transferred from the pilot plant, along with six rolling mills. Two more will be sent next September. In March the rust-stripping plant will be completed. The plant is now in the final engineering stage of the ingot-trex phase; the conceptual engineering for the trex and rust-stripping buildings has been done, and the specifications for the corresponding civil engineering and for the recycling plant have been prepared.

The reprocessing plant is moving forward slowly. At the time of the Castro Madero report, 45.3 percent of the work had been completed. Of the work planned for 1983, 91 percent of the

civil engineering was done, 96 percent of the assembly of conventional services, and 75 percent of the electromechanical work. Its "cold" start is scheduled for the end of 1985, and its "hot" start a year later.

The industrial heavy water plant has run into delays. Even though there are no technical problems involved, the general status of the work in 1983 was only 44 percent of what had been scheduled, which means that 80 percent of the entire plant has been completed, instead of the 89 percent originally set by this date. Further delays are expected as the pace of the work done by subcontractors declines, along with an increase in the total cost, because of the payment of high unproductive costs. It is expected to be completed during the first 6 months of 1986.

Argentine heavy water technology: Atucha and Module 80. The cumulative progress of the Atucha Experimental Heavy Water Plant amounts to 80 percent of the project, but the delays incurred because of budget restrictions will cause the completion of the plant to be postponed until the end of 1984. As for Module 80, the completion of the basic engineering has been postponed until approximately April 1985.

Components testing in the Ezeiza CEAP [Experimental High Pressure Test Chamber]. In the Ezeiza CEAP facility, a preliminary project and the technical specifications for bidding on construction of a test circuit for condensate and cooling pumps have been completed, and the basic design for the valve test chamber and final engineering and manufacture of a stratification test model for an Atucha I Power Plant circuit have been done.

Progress in the development of new nuclear fuels. Fuel plates with 20 percent enriched uranium have been manufactured for reactors of the MTR type (RA-2, RA-3, and RA-6).

Studies for the manufacture of mixed oxide (uranium and plutonium) fuel elements are continuing and the manufacture of a fuel element of the MZFR type (Karlsruhe reactor, the precursor of Atucha) is planned for March 1984. Negotiations to irradiate this fuel in Germany have begun.

At the same time, the development of a 37-rod fuel for Atucha I is continuing, and the first phase of the development of fuel for Atucha II has been completed.

The report Castro Madero presented to the press includes lengthy sections on the production of radioisotopes and intense sources, nuclear safety and radiological protection, as well as international relations. It would be impossible to include all these topics in this summary, but we will comment on them briefly. The report, which begins on a rather gloomy note with the budget situation, concludes with the topic of uranium enrichment. Castro Madero gave special attention to this issue, both because of its intrinsic importance and also because of its controversial nature and the heated reactions this issue has unleashed on both sides.

We will note here simply that on 18 November 1983 Castro Madero announced that the CNEA had succeeded in mastering uranium enrichment technology in a plant located in Pilcaniyeu in Rio Negro province. Starting in 1985, this plant will be able to produce 500 kilograms a year of 20-percent enriched uranium. Later, it can be expanded in order to produce slightly enriched uranium for use in reactors cooled with heavy water.

A rapid glance at the achievements listed in Castro Madero's annual report shows us both the considerable progress of Argentina's nuclear development program, the large number of projects underway, whose completion and start of production will make a considerable contribution to the nation's economic recovery, and also the extent to which the crisis of recent years has created delays in projects such as Atucha II and Arroyito. Such delays cause needless cost increases in the investments required for these projects.

At the conclusion of his report, Castro Madero stated that "despite Argentina's economic and financial conditions, the CNEA's achievements during this year have been highly positive."

That is quite true. But it is also true that output has been much greater than input. This means we are living on our capital. And that is clearly cause for alarm.

7679
CSO: 5100/2084

NUCLEBRAS OPERATIONAL LOSSES IN 1983 DISCUSSED

Official Announcement

Sao Paulo O ESTADO DE SAO PAULO in Portuguese 12 Apr 84 p 32

/Excerpt/ The Brazilian Nuclear Corporation /NUCLEBRAS/ had a net loss of 108.1 billion cruzeiros for fiscal year 1983, equivalent to 5.87 cruzeiros per share, which represents an amount greater than the unit price per share, equal to 5.20 cruzeiros each. The loss is five times greater than that for 1982--20.5 billion cruzeiros, or 1.11 cruzeiros per share. Those figures are derived from the annual financial report of the company published yesterday in the DIARIO OFICIAL DA UNIAO. The company's indebtedness in national currency amounts to 65.8 billion cruzeiros. NUCLEBRAS also owes $723 million, 2.18 billion German marks and 92.2 million French francs. The loans and financing in foreign currency are contracted at annual rates of from 7.2 to 13.4 percent, with the last due date in 1991 for the dollars; 6.6 percent to 12.5 percent per annum, with the last due date in 2003 for the German marks; and 7.2 to 7.7 percent, with the last payment in 1991 for the French francs.

The NUCLEBRAS Group, which is comprised of seven companies: NUCLEBRAS Mining Auxiliary Corporation /NUCLAM/, NUCLEBRAS Isotopic Enrichment Corporation /NUCLEI/, NUCLEBRAS Engineering Corporation /NUCLEN/, NUCLEBRAS Heavy Equipment Corporation /NUCLEP/, NUCLEBRAS Monazite and Associated Minerals Ltd /NUCLEMON/, NUCLEBRAS Nuclear Power Station Construction Corporation /NUCON/ and Nustep GMBH Company, invested 133.9 billion cruzeiros in 1983.

Additional 154 Billion Loss

Sao Paulo O ESTADO DE SAO PAULO in Portuguese 13 Apr 84 p 28

/Text/ Brasilia--The consolidated balance of the NUCLEBRAS Group indicates that in 1983, in addition to a net loss of 108.1 billion cruzeiros, the company--the whole group--had a net loss of 168.2 billion cruzeiros and an even greater operational loss, amounting to 154 billion cruzeiros.

Through legal accounting contrivances, NUCLEBRAS managed to reduce the negative balance of 262.1 billion cruzeiros to 108.1 billion cruzeiros. From the operational loss of 262.1 billion cruzeiros, it deducted the gross operational profit of 3.4 billion and the monetary correction on the permanent assets and the

patrimony, 58.6 billion, also adding the nonoperational expenses, 4 billion cruzeiros. With that, the net loss before income taxes amounted to 207.4 billion cruzieors.

Deducting the income tax, 34.2 billion cruzeiros and 4.9 billion cruzeiros pertaining to the minority participation we arrive at a consolidated net loss of 168.2 billion cruzeiros. Now eliminating the transactions between the companies included in the consolidation "considered only for purposes of consolidation," which amount to 4.9 billion cruzeiros in the portion of the profits contained in the costs of current services and in the cost of future fiscal years; 54.9 billion cruzeiros from financial revenue obtained from the subsidiaries NUCLAN and NUCLEI; and 414 million cruzeiros unspecified, we finally arrive at the figure of 108.1 billion cruzeiros net loss for 1983.

Nuclear Legacy

Sao Paulo O ESTDAO DE SAO PAULO in Portuguese 15 Apr 84 p 3

/Editorial article: "Nuclear Plants, an Inheritance Being Passed On"/

/Text/ NUCLEBRAS' net loss for 1983 rose to 108 billion cruzeiros, 69.4 percent above that recorded the previous year in real terms. The company's domestic and foreign indebtedness continues to increase and the main projects that made up the ambitious nuclear program which envisaged the installation of 10 million kilowatts by 1990 are in large part at a standstill.

The official report, which is contained in the company's report, shows a sad picture of another adventure of the old government, the inheritance of this one, which will be transferred to the next one. Delays upon delays, resulting in accrued interests, in increasing losses, in a veritable bleeding of national and foreign funds at a time when both are desperately lacking. The Brazilian Electric Power Stations Corporation /ELETROBRAS/ is struggling in one of its most serious crises to proceed with its projects of economic hydroelectric plants without which we run the risk of rationing in the event that drought years are repeated in 1985 and 1986. Other similarly strategic and priority sectors are curtailing expenses, while the heavy losses persist in the nuclear area, isolated in a nebulous scheme of national security that nobody understands. As a matter of fact, the Brazilian Government has involved itself in such a way with the German companies supplying equipment and technology for the nuclear program that there is no way of turning back.

We will have to continue paying increasing sums, interest upon interest, which are now beginning to be added on to storage costs. Domestically, the payments to national companies that were to produce the Brazilian components have been overdue since last October although the commitments of the party of the first part to the German industries continue in order by the express determination of the foreign lender banks. Those industries, headed by KWU, are intransigent: they accepted the orders, received payments and want to deliver the equipment of two nuclear plants, already produced since 1980. A small part has already been "deported" to Brazil and it is arriving little by little at the port of Rio. But that represents only five percent of the total. The other 95 percent

is stored in Germany, paying a high storage cost and an even higher price for maintenance, estimated at 1 percent of the total value of the equipment.

Besides the losses of a financial nature, the absorption of technology is not occurring at a desirable rate either from the U.S. Angra-I plant or the future German units. That is due in large part to the lion's-share terms that prevail in the agreements with those firms, which have complete control over the form of transference, which would have been easier if the Brazilian authorities had not enclosed the nuclear program in what is called the circle of national security.

The universities were and continue to be removed from the discussions and studies, which are in the hands of isolated groups of the high-level federal echelon, predominantly military. Very little is being transferred because of the little disposition on the part of the transmitting source and the little preparation or aggressiveness on the part of the receivers. It will not be surprising if we have the same problems with the next nuclear installations--to generate energy, enrich uranium or parallel purposes which cost us millions of dollars--as those we face today with the Angra-I plant, which spends more time shut down than in operation. In the meantime, while the country pays the price of the lack of foresight or incompetence, the mentors of the program continue to be endowed with important positions, as occurs with Paulo Nogueira Batista, former president of NUCLEBRAS and one of the inventors of the Brazil-Germany agreement, who is resting from his battle in favor of NUCLEBRAS in an embassy in the enchanting city of Geneva....

That is the price of impunity--a fact that prevails today in Brazilian public life.

8711
CSO: 5100/2091

YELLOW CAKE, PHOSPHORIC ACID PLANTS PLANNED

PY211745 Sao Paulo O ESTADO DE SAO PAULO in Portuguese 18 Apr 84 p 24

[Text] Mines and Energy Minister Cesar Cals has authorized the start of the construction of pilot plants for the production of uranium concentrate and phosphoric acid from the ore found in Itataia, Ceara State. In the first phase, an investment of $16 million is to be made both in Ceara and in Imbituba, Santa Catarina State, where phosphoric acid can be produced.

The minister said that the testing of the processes will be completed in 18 months, and that the industrial phase could then begin. The plant will be built in Itataia, Ceara State, to produce 2,000 tons of uranium concentrate (U308) and 300,000 tons of phosphoric acid per year. This plant will cost $300 million from a French investment that will be repaid in "ore currency."

On the French side, the Pechiney Igine Kulhman Co will be involved with the project's engineering, and the Cogema Co with purchasing the "yellow cake" (U308). The Mines and Energy Ministry chose the Norberto Odebrecht Construction Co, a Brazilian firm, to coordinate the entire project. Also on the Brazilian side, the Paulo Habib Engineering Co will participate with studies of technical and economic viability, and the Natron Co with the development of a unit for the production of sulphur and phosphoric acid from gypsite, an ore known to be abundant in the northeast.

CSO: 5100/2092

PAKISTAN, INDIA URGED NOT TO CROSS 'THE NUCLEAR THRESHOLD'

New Delhi INDIA TODAY in English 30 Apr 84 p 7

[Article: "The Nuclear Threshold"]

[Text]

A NEW storm cloud is beginning to rise over the turbulence of India-Pakistan relations and, because its shape is ominously mushroom-like, it could deliver the most deadly downpour yet seen in the troubled subcontinent. Already locked in a conventional arms race, India and Pakistan appear to be drifting towards nuclear competition. The signals emanating from Islamabad are troubling. When Dr A.Q. Khan, a top scientist in Pakistan's nuclear programme told the Lahore-based *Nawa-i-Waqt* that Pakistan had the capacity to make the nuclear bomb if it chose to, he could hardly have been speaking out of turn. Nor could he have been unmindful of the reaction his statement would evoke, sooner or later, in India.

Sure enough, replying to the Lok Sabha debate on the budget demands of his ministry, Defence Minister R. Venkataraman declared that it was the Government's assumption that Pakistan had acquired nuclear capability and had decided to act "accordingly". Venkataraman's choice of words is puzzling, especially in view of repeated Indian policy statements—even in the face of reports about Pakistan's nuclear progress—committing the country to peaceful and not military uses of nuclear energy. The most obvious interpretation of the minister's remark is that the Government has decided that India cannot lag behind Pakistan, and that if Pakistan is ready to demonstrate its nuclear ability, so must India be.

If the Indian reaction was deliberately ambiguous, there is nothing uncertain about where Pakistan is headed. The blunt fact is that having pursued its nuclear objective with single-minded resolution, Pakistan has arrived at or is very close to the nuclear threshold where India halted after the Pokhran explosion in 1974. Whether or not Pakistan wants to make the bomb, it will surely not stop short of parity with India, the ability to create a "peaceful" nuclear explosion, justifying it, if necessary,

in more or less exactly the terms India used to fend off international criticism.

It needs little imagination to estimate what the reaction would be in India if Pakistan were to demonstrate its ability to trigger off a nuclear explosion. Would India concede nuclear parity if Pakistan, like India in 1974, demonstrates its abilities but refrains from making the bomb? Or would the Government be unable to resist the enormous pressures that will be generated for a repeat performance? It is certainly within India's means to build a moderate number of nuclear weapons but once it has sprouted nuclear teeth, will Pakistan be content to take second place rather than join the race and catch up again?

These are no longer academic questions, and they are questions that must be addressed sooner rather than later—before the race gets going, before points of no return are reached, before nuclear explosions become a reality a second time round in South Asia. It is no use depending on outside powers to pull Pakistan in line. President Zia has, after all, managed to acquire the necessary know-how and hardware legally and clandestinely without evoking any retaliatory measures from the United States; and he seems intent on continuing this strategy. Indeed, if anything, the Pakistanis have managed very successfully to balance the acquisition of nuclear capability with the acquisition of sophisticated American armaments, something which ought—in theory, at least—to be impossible if the claims made by the Americans are to be believed.

Last week, the US Senate Foreign Relations Committee adopted an amendment prohibiting the US Government from providing military aid to Pakistan unless President Ronald Reagan certified that Pakistan did not have and was not working on a nuclear bomb. Predictably, a senior minister in Islamabad shot this down calling it "interference" and describing Pakistan's nuclear programme as "peaceful" in terms quite reminiscent of India's own protestations at the time of Pokhran and since.

The Americans, who have given Pakistan more and more dazzling conventional weapons in the hope that they will keep Pakistan from going nuclear and maintain some leverage in Islamabad, have a special responsibility in thwarting Pakistan's nuclear ambitions. Even as they must own up to this responsibility, it is entirely possible that they will not succeed. Their leverage will diminish in 1986 when the aid package is complete and there is not the slighest guarantee that the US will indeed shun a Pakistan which has nuclear explosion capability; it is, after all, an integral part of their strategic thinking in the Persian Gulf area.

If no other country can be relied upon to pull these chestnuts out of the nuclear fire, then there is no option but for India and Pakistan to sit at a table and thrash out the nuclear question without mincing words. The dialogue will naturally go in stages—via the no-war pact and friendship treaty, if necessary. But ultimately it must get to grips with nuclear problems which have so far been unmentionable. Neither side can continue to pretend any longer that it is unconcerned, nor can India afford to turn a Nelson's eye to the nuclear threat. There is no surety that the dialogue will succeed. And if it does not, India may well be obliged to join the nuclear race. Not to make a serious attempt to keep the South Asian region out of a nuclear arms race before the dice is thrown will be a gross disservice to posterity, for once the nuclear threshold is crossed, there will be no going back.

CSO: 5100/4716

ANALYST COMMENTS ON INDIAN POSITION IN IAEA

Madras THE HINDU in English 28 Mar 84 p 9

[Article by G. K. Reddy]

[Text] NEW DELHI, March 27. The Indian efforts to persuade--and even bring pressure upon--the big nuclear powers to let it retain its permanent seat on the board of governors of the International Atomic Energy Agency (IAEA), even after China's inclusion, have so far met with little success, since some of them seem to be bent on indirectly downgrading its position.

The 34-member board of governors consists of 12 "designated" members representing both globally and regionally advanced countries, while the remaining 22 are elected for two years on a rotational basis with 11 of them retiring and being replaced every year at the time of the annual conference of the 111-member organisation.

According to latest reports from Vienna, the big nuclear powers are working on a disingenuous formula to increase the number of "designated" countries from 12 to 13, which was the case before Taiwan was expelled 12 years ago, but blur the distinction between globally and regionally advanced nations. The ostensible purpose of dispensing with this distinction is to give both China and India an equal status for the time being without really increasing the number of permanent seats on the board.

Implication: But in effect, as a permanent member of the Security Council, China will be brought in for all practical purposes as a permanent member enjoying equal status with the United States, the Soviet Union, Britain and France, while India will be downgraded as a regional representative that is no longer regarded as a globally advanced nuclear State. The implication of this would be that the permanent character of India's representation could be challenged by a country like Pakistan at some point by staking its claims to a place on the board as a regionally advanced nation. The excuse given for increasing the total of "designate" members from 12 to 13 without specifically restoring the earlier number of globally-advanced countries to nine is that, while it is well within the realm of the board of governors to increase the first figure subject to the approval of the annual conference, any attempt to enlarge the number of permanent members would require the amendment of the IAEA's statutes which would be a very cumbersome and controversial procedure.

The board of governors is due to meet in June and it is India's hope that some satisfactory solution would be found to this problem to safeguard its interests. But if this is not done and the board decides to go ahead with the move to increase the overall number of permanent members, and blur the distinction between globally and regionally advanced States, without specifically stating that even after China's admission it would continue to retain a seat in its own right without any change in its status. India will have to take some hard decisions to safeguard its interests.

Apart from the U.S., the Soviet Union, Britain, France, Canada and China, India is the only country with a full nuclear cycle. It cannot allow itself to be downgraded from its equality with the other globally-advanced countries like West Germany and Japan or bracketed with Argentina/Brazil, Australia and Belgium/Italy which have been given permanent places as regionally-advanced States.

The Ministry of External Affairs, the Atomic Energy Commission and the Prime Minister's Secretariat have been following these developments closely and reviewing India's startegy to face this attempt to relegate it to a secondary position on the IAEA Board. But what is really disquieting from India's point of view is that this bid to downgrade it in the Vienna-based body fits into a broader pattern of similar moves to reduce its influence in several other international organisations under the pretext of providing better representation to other countries like China and Japan or even third world countries like Pakistan.

CSO: 5100/7073

GANDHI NOTES PAKISTAN URANIUM EFFORTS

New Delhi PATRIOT in English 29 Mar 84 p 5

[Text]

The Government is aware of Pakistan's efforts to acquire uranium enrichment capability and is vigilant in the matter, Prime Minister Indira Gandhi told the Lok Sabha on Wednesday.

In a written reply to Mr Krishna Pratap Singh, she said that Indian scientists were keeping abreast of all aspects of research and development connected with modern and relevant technologies.

Replying to a separate question of Mr Chintamani Jena, the Prime Minister said in pursuance of its policy, India co-operated with several industrialised and developing countries in various aspects of peaceful uses of atomic energy both through the International Atomic Energy Agency and on a bilateral basis. In the recent past, no offer of financial aid had been received from any country for India's atomic energy projects, she said.

Minister of State for Science and Technology Atomic Energy and Space Shivraj Patil told Mr Satyanarayan Jatiya in a written reply that the total installed capacity of nuclear power as on 1 March this year was 1095 mwe, and about 70 per cent of it was being utilised at present.

He said the Unit-1 of the Rajasthan atomic power station of 220 mwe capacity had been shut down since 4 March 1982, for repair of the south end shield.

Mr Patil replied in the negative to a question whether the country's nuclear programme had sufferéd a serious setback due to the shortage of enriched uranium and heavy water.

The Minister pointed out that the country's nuclear power programme was primarily based on heavy water reactors using natural uranium as fuel and heavy water as moderator and coolant.

To overcome the constraints and to meet the needs of the nuclear power programme, production at the existing heavy water plants was being accelerated and more such plants were being set up. Exploratory work on uranium resources was being accelerated. The design of 235 mwe unit had been standardized to the extent necessary for "series" ordering of major equipment and components.

Mr Patil said the design of a standardised 500 mwe unit was in progress.

"The policy is to continue setting up a series of pressurised heavy water reactor units of 235 mwe size followed by 500 mwe units", the Minister told Mr Mohanlal Patel.

He said requests had been received from time to time from many States such as Rajasthan, Punjab, Andhra Pradesh, Madhya Pradesh, Tamilnadu, Kerala, Karnataka and others for setting up atomic power plants. The site selection committee constituted by the Department of Atomic Energy was examining various sites suggested by the State Governments.

CSO: 5100/7074

NUCLEAR DANGERS FROM NEIGHBORING COUNTRIES DISCUSSED

New Delhi PATRIOT in English 29 Mar 84 p 1

[Article by Subodh Satyarthi]

[Text]

It is not clear from what the official spokesman has said of Mr M K Rasgotra's conversation with foreign journalists in Delhi whether the official was deploring the publication of the information furnished by the foreign secretary or saying that Mr Rasgotra had received no report on the test of a Pakistani nuclear device in the Lop Nor desert of China's Sinkiang.

However, neither of the above questions is really the issue. Whether the foreign journalists who heard Mr Rasgotra broke the basis on which he spoke to them, or one of them misunderstood him, is of little concern to the people at large. It is important for the country to know that high government officials have had reports of the advance Pakistan has made in its drive for a military nuclear capability, and the Chinese authorities are helping Islamabad's nuclear weapon project.

Mr Rasgotra, presumably, will say that these accounts are unconfirmed and, in any event, he should not have been cited as the source of the journalist's information. May be. That does not uphold the view that reports on Pakistan's bomb, however unconfirmed, should not be given currency. Nothing less than India's strategic defence is at stake and the peole have every right to demand of all media whatever information is available on the subject.

Not all information thus received will be authoritative or correct. But, seeing that the country's official establishment has slothfully failed to come to grips with the nuclear threat which has been growing over India's horizon for the last 20 years, the people will welcome any information from any source on this danger. Since the authorities appear not to have an answer for the nuclear danger to India's security, let these reports bring home to the country the enormity of the military nuclear programmes in India's neighbourhood.

According to an Associated Press report, 10 months ago, the Chinese helped Pakistan detonate its first nuclear explosive in the Lop Nor desert. It appears that the Government of India did not trust that report because Indian officials could not believe that China would make such a blunder.

This account confirms official India's faith in Beijing's judgment. But that is not the point at issue. If China has indeed extended to Pakistan the hospitality of its territory for testing a Pakistani nuclear device, then Beijing's assistance has abridged the lead-time Islamabad would have needed to acquire the capability. By detonating the explosive on Chinese territory, Pakistan can avert the complications which a nuclear explosion on Pakistan territory would have entailed.

A nuclear bang on Pakistan territory would certainly affect the US Congress's opinion of the wisdom of the vast military-economic package of aid President Reagan has pledged to General Zia. If a Pakistani device is tested on the territory of another country, the Reagan administration presumably would plead ignorance and continue military assistance to Pakistan.

The alibi of ignorance in this case would not wash, and it would be reasonable to conclude that the strategic consensus the US administration seeks in Asia provides for Sino-American collusion in Gen Zia's military nuclear ambitions.

Reports on the progress of Pakistan's military nuclear plans, in the light of what Dr A Q Khan and America's Dr Paul Leventhal have said, contain dire imolications for this country. For 20 years India has lived under the shadow of China's

growing nuclear arsenal. India is one of the countries on which China has targeted its thermonuclear weapons.

Now, the menace of Pakistan's military nuclear programme has made this threat an immediate one. This country has been hoping against hope that Pakistan would not cross the Rubicon and that it would be restrained by world opinion and the nuclear-weapon States. It is thought that China, a permanent member of the Security Council, would not lend active support to Pakistan's plans.

But this is a grossly inadequate response to a danger which had been growing from year to year. In the face of this threat to our security New Delhi has reacted so far with indecision. To continue to do so will border on criminal negligence.

A nonaligned country, India has no military alliance with any existing nuclear-weapon State. India's strategic defence is her own responsibility. Even France, a member of NATO, has refused to surrender its national responsibility for the strategic defence of French territory and has doggedly acquired an independent nuclear force. India, which has been subjected to four aggressions in 37 years and still has parts of her territory occupied by her immediate neighbours, has failed to devise a credible policy for her defence and security.

This country's security is menaced by the growing nuclear arsenals in the neighbourhood. Nothing the Government of India has said or done so far matches the seriousness of the dangers unfolding for this country. Nuclear threats are not met by a 20-year plan for manufacturing an indigenous battle tank. There is no time to lose. It is time for firm decisions and effective action.

CSO: 5100/7074

KALPAKKAM MEETING OF NUCLEAR SCIENTISTS ENDS

Madras THE HINDU in English 24 Mar 84 p 9

[Text] MADRAS, March 23. The four-day meeting at Kalpakkam of nuclear scientists from nine Asian and Pacific nations ended today with the working group expressing satisfaction with the progress of their common research projects in the field of nuclear science and medicine.

The nations are members of the Regional Cooperative Agreement (RCA), established in 1972 to promote cooperation in nuclear research. The meeting enabled them to talk and hear advance made in applying nuclear technology to industry, agriculture and medicine in their countries.

The working group noted that the food irradiation project had reached a stage where it could be taken up on a commercial scale for specific commodities. Dr. P. K. Iyengar, Director, Bhabha Atomic Research Centre, who chaired the conference, told THE HINDU today that radiation would come in handy to preserve foodstuffs.

Agricultural produce, he said, is liable to be ruined by pests if stored for more than six months. Countries such as India need to store them for up to two years as an insurance against fluctuating annual production. Chemical fumigants, now in use, were not satisfactory since they did not act all the time and might have residual toxic effects.

When agricultural produce is subjected to gamma radiation, the micro organisms that cause its deterioration are killed. If it can then be sealed and stored in silos, it would stay good for at least two years.

The problem of a safe and effective level of radiation has now been solved, he said. The Union Health Ministry has declared that onions and potatoes can be irradiated. A pilot plant is proposed to be set up for this purpose.

The Bangladesh representative announced that human consumption of irradiated food has been cleared in his country, while the Thai delegate said irradiation of onions and potatoes would soon be done there on a commercial scale.

The working group noted that the studies on use of radiation to sterilise medical supplies were completed last year with the compilation of a practice

code. Syringes, needles and surgical cotton can be sterilised with their packaging intact, using this technique.

Among the industrial applications successfully developed by RCA projects is the nucleonic gauging system that has been installed at the Bokaro Steel Plant. It constantly controls the thickness of steel being rolled out.

In Indonesia, radiation is used to vulcanise rubber, and electron beams to treat the surface of wood.

In medicine, research is on to standardise cancer therapy and apply nuclear medicine for thyroid, liver, diseases and tropical parasitic illnesses.

Dr. Iyengar said the RCA research programmes, with their emphasis on manpower training had gone a long way in building up a reservoir of scientific talent in the countries of this region. A training course conducted in Trombay recently on the use of microelectronics in research reactor utilisation was, particularly appreciated, he said.

CSO: 5100/7071

BRIEFS

DELHI NUCLEAR SCIENCE CENTER--New Delhi, March 23 (PTI)--The University Grants Commission has approved a proposal to set up a nuclear science centre in the university sector for research in certain areas of physics, chemistry, biology, medicine and various applications. The centre, will ensure a balanced growth of scientific and technical manpower and would help in removing certain gaps in the frontier areas, the Rajya Sabha was informed today. The estimated investment on the centre is Rs 2.66 crores in the Sixth Plan and Rs 11.3 crores in the Seventh Plan, Mr P. K. Thungon, deputy minister of education, told Mr V. Gopalasamy and Mr V. Venka in a written reply. The centre will be operated by a consortium of universities and institutes. The implementation of the project has been entrusted to a project steering committee. The precise linkage between the centre and the JNU is still to be decided, he added. [Text] [Calcutta THE TELEGRAPH in English 24 Mar 84 p 5]

THORIUM USE TECHNOLOGY DEVELOPED--The Lok Sabha was informed today that the country has developed a technology for use of thorium as feedstock for atomic power reactors. The house was also informed that there is no deterioration in the performance of the nuclear power plants, particularly those using natural uranium as feedstock. [Text] [BK021055 Delhi Domestic Service in English 0830 GMT 2 May 84]

WASTE DISPOSAL PLANT DEVELOPED--The country's nuclear power program has taken a new leap toward total safety to the environment with the setting up of the first nuclear waste disposal plant at the Tarapur atomic power complex. The director of the Bhabha Atomic Research Center, Dr (P.C. Ayengar), told PTI that the entire plant, known as the nuclear waste immobilization plant, has been developed indigenously. With the setting up of the plant, India has joined the select band of countries like France and Britain who use the same technology to dispose off the highly radioactive nuclear waste. [Text] [BK011034 Delhi Domestic Service in English 0830 GMT 1 May 84]

CSO: 5100/4715

COMPUTER SYSTEM, EQUIPMENT AT ROSSING URANIUM DETAILED

Johannesburg THE STAR in English 25 Apr 84 p 13M

[Text]

The activities of Rossing Uranium in Namibia have proved so successful since the opencast mine started 10 years ago that it now extracts a million tons of ore and waste rock weekly.

It capacity is 5 000 tons of uranium oxide a year, the final product being exported to many countries for use as a fuel in nuclear power stations.

A mining operation on this scale needs the use of information technology in most areas and, despite the remoteness of the site in the Namib Desert, competition to obtain the business was keen.

The company chose ICL because, it said, it offered the best solutions and could give quick support from the nearby capital of Windhoek.

Now installed are three ME29 mainframes, a network of 95 DRS systems, 8801 word processors and a PERQ graphic workstation.

They run applications for personnel, non-stock ordering and receiving, payroll, tender analysis, material supply, general ledger, creditors, maintenance costing, fixed assets, medical aid, short-term mine planning and metallurgical systems.

Rossing also pioneered with ICL the implementation of planned maintenance. This includes preventive maintenance on every piece of equipment used by the mine.

The planned maintenance application also deals with inventory, pre-defined maintenance and full historic details of the work done and condition of all plants.

The mine plans by the end of the year to have the PERQs on an OSLAN for plotting and planning.

Rossing's DP superintendent, Mr Jack Brear, says the company has had excellent service from the configuration of triple ME29s.

"As our systems are now exceeding the capacity we are looking towards a transition to VME. As an interim measure we may upgrade the three computers to models ME29/54 so that we can safeguard our investment in a number of new major systems.

"The new mainframe systems will be based around on-line database technology and we anticipate using the facilities of CAFS to enable user access to extensive history files," he says.

December this year will see the end of a three-year project in which some 75 man-years of systems work will be completed, with the installation of 10 major new systems and the on-line network expanding from 30 terminals and six printers to more than 100 DRS terminals and 35 printers.

CSO: 5100/34

BRIEFS

KOEBERG UPS POWER--Cape Town--The Koeberg nuclear power station started operating at 50% of the capacity of its first unit yesterday, the Electricity Supply Commission (Escom) announced last night. The unit is now generating about 460Mw. It has been operating at 30% of its capacity since it started feeding electricity into the national grid on April 4. The reactor began operating on March 14. The Atomic Energy Corporation gave Escom permission to increase the unit's capacity after the completion of a series of tests at the lower level, an Escom spokesman said last night. These tests included the simulation of faults in the reactor. A similar series of tests will now be done at the 50% level before permission is given to increase capacity further. The unit is likely to be operating at 100% capacity by mid-July, the Escom spokesman said. The reactor's other unit is not yet operating. [Text] [Johannesburg RAND DAILY MAIL in English 17 Apr 84 p 5]

CSO: 5100/32

INVOLVEMENT IN CHOOZ NUCLEAR POWER PLANTS DETAILED

Brussels LE SOIR in French 20 Apr 84 p 2

[Article by Guy Duplat]

[Text] We will be partners in the forthcoming nuclear generating plants at Chooz. The decision has been made and is irreversible. On Tuesday [17 April] Belgian cabinet ministers Eykens and Knoops, as well as Jean Auroux, their French colleague and secretary of state for energy, reached an agreement which ended 2 1/2 years of interminable discussions. This agreement does not yet settle everything, but the major step has been taken. In our previous editions we presented the main themes of this agreement. On Wednesday [18 April] the different groups concerned applied the finishing touches, which makes it possible today to make clear the extent of the agreements which have been approved.

First, let us recall the reasons for this unusual nuclear agreement. At the end of 1981 France decided to build two new 1,300 Megawatt nuclear generating plants at Chooz, on the Meuse River, not only on our border but actually almost within our country, since the Givet area forms a salient in Walloon territory.

Rather than bearing by itself the problemss involved with these nuclear generators, Belgium quickly sought to benefit from the Chooz plants. By paying for a part of the generators, Belgian leaders, and especially Etienne Knoops [secretary of state for energy], said that we could have a voice in decisions on the nuclear wastes emptied into the Meuse River and have our builders and researchers, whose order books are painfully empty, participate in the work.

The Belgian producers of electricity, by participating in the Chooz generators, could spread out their investments more effectively and over time as a function of the demand for electricity. However, in exchange for that, France asked that its own builders participate in a forthcoming Belgian nuclear generator.

Could we negotiate in any other way and prevent the installation, pure and simple, of these nuclear generators at Chooz, or reject this clause of reciprocity demanded by the French builders? Perhaps so, but now the question has become purely academic.

To express these intentions in concrete terms, it was necessary to have a debate on energy in the Belgian Parliament, a discussion on a plan for the equipment of the electricians, and a long French-Belgian negotiation.

Three-Stage Agreement

The agreement reached on 17 April involves three stages.

First of all, between electricity companies (EDF--French Electric Power Company --for France and Ebes-Intercom-Unerg for Belgium). The Belgians agreed to purchase a 25 percent interest in the first of these new nuclear generators at Chooz (Unit B-1), whose entry on stream is envisaged for 1992. They will also purchase a 25 percent share in the second nuclear generator (B-2), but they will then be able to purchase this share, if they so wish, after its entry on stream (between 1994 and 1997).

In exchange for that EDF can take a 50 percent share of the electraicity from the Doel V generator, the future Belgian plant, but this is not an obligation. This future Belgian generator will only be decided on in terms of our electricity needs, without any date limit and with the possibility (no doubt only theoretical) of previously constructing a coal-fired electricity generator.

The electricity sold to Belgium will be at the French cost price.

Therefore, there will be no more question of penalties and increases in the price of electric current sold if the Belgians delay too long in building the Doel V plant. Technical or economic delays will be accepted. On the other hand, Eykens and Knoops have committed themselves, in the name of the Belgian Government, to no political delays (a nuclear moratorium, for example). In such a case the agreement reached last Tuesday [17 April] is to be reconsidered. In that connection we might ask if a decision to build a large, coal-fired electricity generator in the Limbourg area to satisfy the coal lobby and against the views of the electricians would not be considered by the French to be a political delay.

For 11 Billion Belgian Francs in Orders

The second Franco-Belgian agreement concerns the builders. The Belgians will handle 22.5 percent of the construction of the B1 and B2 generators (ACEC [Charleroi Electrical Engineering Shops], 3 billion Belgian francs in orders; Cockerill-Mecanique Company, 3 billion Belgian francs; Franco-Belge de Fabrication de Combustible [Franco-Belgian Fuel Fabrication Company], 2 billion Belgian francs; Fabricom, 1.2 billion Belgian francs; and feasibility study bureaus, 1.4 billion francs). In exchange for that the French builders will contribute 45 percent of the construction costs of the Doel V plant.

Finally, the third agreement links Belgian electricity firms and French builders. The Belgians are committed to placing orders with the French for the Doel V plant before 31 March 1987. If they place the orders later than that, they will have to pay progressively growing penalties. The electricity producers consider that the probability of not placing orders for the Doel V plant before 31 March 1987 is very slight. Nevertheless, it is clear that this clause--between purely private business partners--tends to force the future choice toward the Doel V plant, to some extent.

Regarding the problems of the flow of water in the Meuse River, an agreement has already been reached. The French will shut down one of their electric generators

if the flow of the river at the Franco-Belgian border falls below 22 cubic meters per second. And they will shut down the two generators if the flow falls below 20 cubic meters per second. These flows correspond to nearly 50 cubic meters at the Dutch border, as demanded by our neighbors in the Netherlands. However, of course, it is always possible that a drought will bring the lowest flows of water in the Meuse River below these limits. That is why the matter of a dam on the Houille River to regularize the flow of that river is still an open question. Minister Knoops said: "The discussion of this question will be followed up very quickly."

All aspects of this agreement must still be submitted to the cabinet (apparently on 27 April).

This agreement certainly will be of great interest to Walloon industry, which will be the principal beneficiary. However, there are some ambiguities in it, in particular as far as the future, coal-fired generator is concerned. If the rate of growth of electricity demand remains what it is (up 3.5 percent over the past 12 months), there will be no problems. The Doel V nuclear generator and a coal-fired generator will be built. However, if this rate of growth is not maintained, as is very probable, the government will have to face up to its responsibilities and explain itself, in such a case, to the Limburgers.

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CSO: 5100/2558

RESPONSE TO NUCLEAR ACCIDENT TESTED IN EXERCISE

Helsinki HELSINGIN SANOMAT in Finnish 20 Mar 84 p 7

[Unsigned article: "Trial Run of Private Radiation Shelter Started in Virrat"]

[Text] Virrat (HS)--"It is suspected that a nuclear explosion accident has taken place..." With these words the trial run of Virrat's ballyhooed radiation shelter got started on Monday. Four women and 18 men were enclosed in rock to test the shelter's operational characteristics and engineering. The test group is to be isolated from the outside world until next Friday afternoon.

There are about 250 square meters of space in the private radiation shelter built by the Raiski Construction Firm of Virrat. In a real situation the shelter can accommodate 80 persons, and they are able to exist there 30 days and nights. Total expenditures for the shelter are about 1.5 million marks. The intention is to place shares on the market for prospective buyers through a corporation which maintains the shelter.

"The sale of shares hasn't begun, because first we want to test the shelter's workability with the help of this experiment and make the project credible," said Director Pentti Raiski, who is himself a guinea pig in the shelter. According to Raiski there have been a lot of inquiries about shares. In addition several provinces are interested in their own shelter.

The persons participating in the experiment are volunteers and come from different parts of the country. There are several reporters in the group. The ages of the persons in the experiment range from 21 to 69.

The object of the experiment is to make clear how human beings manage under circumstances in which normal activities are restricted or lacking entirely.

The Psychology Institute of Tampere University is studying the individual reactions of the persons in the experiment as well as the adaptability of the entire test group to the situation.

In the testing of the technical equipment a special watch will be kept on the functioning of the air conditioning, the capacity of the carbon dioxide

eliminators, the medical oxygenation system and the functioning of the emergency power units. During the experiment light will also be shed on how the food supply is to be organized in a real situation.

"If the trial run succeeds, we are prepared to build additional shelters of this type as key civil-defense centers in provinces and cities," Director Raiski says.

Raiski criticized the present system--it has been in force for about forty years--in accordance with which population shelters, which do not help the inhabitants in a real situation, are built into blocks of flats.

"In the shelters built according to present regulations the inhabitants can exist for four hours at the most, because in that time their temperature, for example, rises about the limit of tolerance. They are uselessly expensive storerooms for skis," Raiski says.

In designing the Virrat radiation shelter the point of departure has been that the country will not be bombed in a crisis situation.

"This shelter is made specifically for protection against radiation and dangerous pollutants," he says.

There are about twenty meters of rock on top of the shelter. Outwardly the shelter is seen only as a television antenna planted in the side of the rock. A wall of the shelter's so-called women's room is papered with newspaper clippings dealing with the shelter. "The project has received an inordinate amount of publicity. In the beginning it was almost exclusively negative, later on, positive," Raiski said.

Mrs Hilkka Lahti of Virrat is one of the experiment's oldest participants. She became interested in the experiment because her husband worked as a civil defense instructor before retiring.

"Shelters of this type are needed, because along with the danger of radiation the pollutants will increase tremendously," Lahti said. She is hardly going to buy a share for herself: "I'm already an old person."

Lahti had brought needlework and literature along with her. "We don't know yet what kind of daily program we'll follow, but there won't be enough to do."

According to Lahti there is no use trying the shelter if you have a dread of closed places. "Myself, I practiced this as a little girl in the bomb shelters of Tampere," she said and gave a short laugh.

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CSO: 5100/2555

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